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Generic Quality Assurance Project Plan Guidance for Programs Using Community Level Biological Assessment in Wadable Streams and Rivers

ACKNOWLEDGMENT

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FOREWORD

In order to help ensure that environmental monitoring data are of known quality, U.S. Environmental Protection Agency (USEPA) has established specific requirements for development of Quality Assurance Project Plans (QAPPs). These QAPPs are required for environmental monitoring tasks accomplished within USEPA by its contractors and its grantees.

Since 1980, the standard guidance for developing QAPPs has been the Quality Assurance Management Division's (QAMD) 005/80 "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans". This guidance has now been replaced by EPA QA/R-5 "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations," Draft Interim Final August 1994.

The new QAPP guidance provides considerable versatility in preparation of QAPPs for particular data needs. Among the new materials and approaches introduced by EPA QA/R-5:are inclusion of the Data Quality Objectives process in the QAPP; an expansion of additional elements to be addressed in QAPP; and an approach that permits "tailoring" the comprehensiveness of the QAPP to the nature of work being performed and the particular use of the data.

For many years the major water monitoring efforts of USEPA have focused on chemical/physical measurements. Accordingly, guidance documents, such as those for developing QAPPs, have tended to utilize terminology and examples relevant to these monitoring measurements.

The recent expansion of biological monitoring has brought new terminology and approaches which do not fit "comfortably" in the past chemical/physical descriptions. Within the USEPA, Office of Water it has become apparent that some means must be found to ensure effective control of data quality for these measurements. Accordingly, it was decided that a generic QAPP for biological measurements, following the structure of the QAPP which had evolved from chemical/physical measurements, would be of considerable value; hence, this document.

This guidance is based upon EPA QA/R-5. However, wherever appropriate, biological terminology and examples are given to facilitate use in the discipline of biological monitoring. In addition, "element" descriptions have been expanded to facilitate use by biologists and others who may not be familiar with the terminology and approaches typical of chemical/physical monitoring and laboratory analysis.

Development of this guidance has involved extensive inputs, reviews, and recommendations of a wide community of biologists expert in various areas of biological monitoring and analysis. USEPA Quality Assurance Officers well-versed in the use of QAPPs in more typical chemical/physical measurement and analysis have

also reviewed this document. The Quality Assurance Management Division of USEPA, responsible for the USEPA QA program and its guidance documents, has provided assistance in this adaptation of EPA/QA/R-5 to biological monitoring.

As in the case of all new guidance, however, considerable insight for improvement will be gained from its use. Hence, the users of this document are urged to send comments on utility and suggestions for improvement/expansion to *USEPA 4503F, Assessment and Watershed Protection Division, Monitoring Branch, Washington, D.C. 20460, Attention: Biological Monitoring Coordinator.* As experience is gained and use expands, revised editions of the document will be considered.

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INTRODUCTION

Quality Assurance (QA) - an integrated system of activities involving quality planning, quality control, quality assessment, quality reporting and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence.

Quality Control (QC) - the overall system of technical activities whereby the purpose is to measure and control the quality of a procedure or service so that it meets the needs of users. The aim is to provide quality data that is satisfactory, adequate, dependable, and economical. One example of a quality control element for biological sampling is taking replicate samples to ensure consistency among and within sampling crews.

Quality Assurance Project Plan (QAPP) - a formal document describing the management policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an agency, organization, or laboratory for ensuring quality in its products and utility to its users.

A QAPP is a technical planning document that defines the objectives of a project or continuing operation, as well as the methods, organization, analyses, and QA and QC activities necessary to meet the goals of that project or operation. The EPA requires that all monitoring and measurement projects carried out by or supported by USEPA have written and approved Quality Assurance Project Plans (QAPPs). This document represents generic guidance for development of QAPPs for specific bioassessment projects or programs. This generic QAPP is based upon "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operations," EPA QA/R-5 (USEPA 1994, Draft Interim Final)[1]. The expanded descriptions and application guidance have benefited from utilization of the Office of Water Quality Management Plan and previous Office of Water QAPP guidance OWRS QA-1 "Combined Work/QA Project Plans for Environmental Monitoring" (USEPA 1984). A variety of sources have provided materials assisting in development of "biological" examples in the QAPP. These include the work of the Environmental Monitoring Systems Laboratory (Cincinnati, Ohio) to develop QA guidance for establishment of biological assessment programs; technical QA literature (Smith et al. 1988); and selected bioassessment documents (Karr et al. 1986; Ohio EPA 1987; Plafkin et al. 1989).

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[1]However, a slight modification in format has been made. The "elements" of this QAPP guidance are numbered sequentially instead of being broken down by sections A, B, C, and D. The items covered have the same titles as in QA/R-5.

This guidance does not promote one bioassessment procedure over another; it does provide a QA framework to which different bioassessment programs may be adapted. It is designed to allow flexibility with regards to all components in developing a bioassessment program. It has been specifically designed for use by states using bioassessment protocols that focus on community-level responses as indicated by a multimetric approach and taxonomy to the genus/species level.

Community - a group of interacting assemblages in a given geographic location. Consists of all living components: fish, amphibians, benthic macroinvertebrates, algae, macrophytes, microbes, etc.

Assemblage - a group of interacting populations of organisms in a given geographic location (for example: a fish assemblage or a benthic macroinvertebrate assemblage).

Sampling gears should be appropriate for the habitat and region being sampled and may include active or passive collection devices such as square meter kicknets, dipnets, square foot surber samplers, ponars, Hester-Dendy artificial sampler, basket samplers for macroinvertebrates; electrofishers, seines, and Fyke nets for fish; and knives for scraping, eyedroppers, and containers for dislodging epiphytic algae from macroalgae for algae collections. As is customary for biological programs, pilot studies (or initial year of data) are recommended to investigate sources or error, variability, and representativeness of the monitoring program.

Who is responsible for having QAPPs? USEPA QA policy (Order 5360.1) stipulates that specific monitoring projects or continuing operations undertaken with all or partial USEPA funding be covered by a QAPP. A continuing operation is one in which the procedures are not modified significantly from year to year. For this type of environmental program, a single QAPP that describes these routine activities would be prepared. The QAPP serves as the blueprint for implementing the data collecting activity and ensures that the technical and quality goals of the operation are met. It also provides the necessary link between the required data quality constraints and the sampling and analysis activities to be conducted.

Programs that have ongoing, repetitive, or small scale sampling events that follow specific Standard Operating Procedures (SOPs) should develop a QAPP for the overall program; this alleviates the need for specific QA plans for each sampling event. The QAPP is then cited in the workplan. State programs developing QAPPs should query other state agencies (e.g., Department of Fish and Wildlife, Department of Health, Department of the Environment, Department of Natural Resources) to determine if a base QAPP currently exists for their type of project. Agencies can draw from this base plan by outlining the rationale for any changes made in adapting it to their project; or if it is suitable for a program, the base QAPP can be cited as the program QAPP. If no base plan exists in the state for community-level, organism-

based, biological assessments, the program should use this guidance as the template for developing their QAPP. In the case of single biological assessment events (i.e., a non-routine assessment or special study), abbreviated QAPPs can be developed (Appendix B). Such a plan will not need to include extensive language, rationale, or justification for all elements and can take the format of an outline. If individual elements of the QAPP guidance are not related to any aspect of the project, it should be noted in those sections as "not applicable". This short form also provides an overview of the QAPP.

What is the process for implementing the QAPP? For internal USEPA projects, the QAPP is reviewed and approved by the Quality Assurance Officer (QAO). QAPPs are distributed to the personnel performing the assigned work, and implemented as written unless modified as described above. The process of preparing and implementing QAPPs is shown in Figure 1.

Review and control mechanisms are established for each project in the QAPP and will vary in complexity and scope depending on the particular project. Large-scale, national projects will form QA-task groups to provide the lead in preparing Data Quality Objectives (DQOs) (Section 6) and QAPPs. These same groups will review the QA data on an ongoing basis, conduct audits, and recommend remedial action. If changes to work in progress are needed, the QAPP should be revised, reviewed, and approved by the Project Officer and the QAO and then distributed to personnel performing the work. For continuing operations, the QAPP is reviewed annually and revised whenever significant changes are made in procedures or organizational responsibilities. A QAPP must be approved by the QAO prior to the initiation of data collection activities.

How is this guidance document organized?

- Sections 1 and 2 of this document give examples of an appropriate QAPP title page and table of contents. In addition, all QAPPs must be prepared using a document control header placed in the upper corner opposite the binding of each document page. At a minimum, the header should include the information indicated in Section 1.3.

- Possible techniques for presentation of project organization and lines of responsibility are outlined in Section 4.

- Section 5 provides suggestions for producing a project description that illustrates the background and rationale of the project.

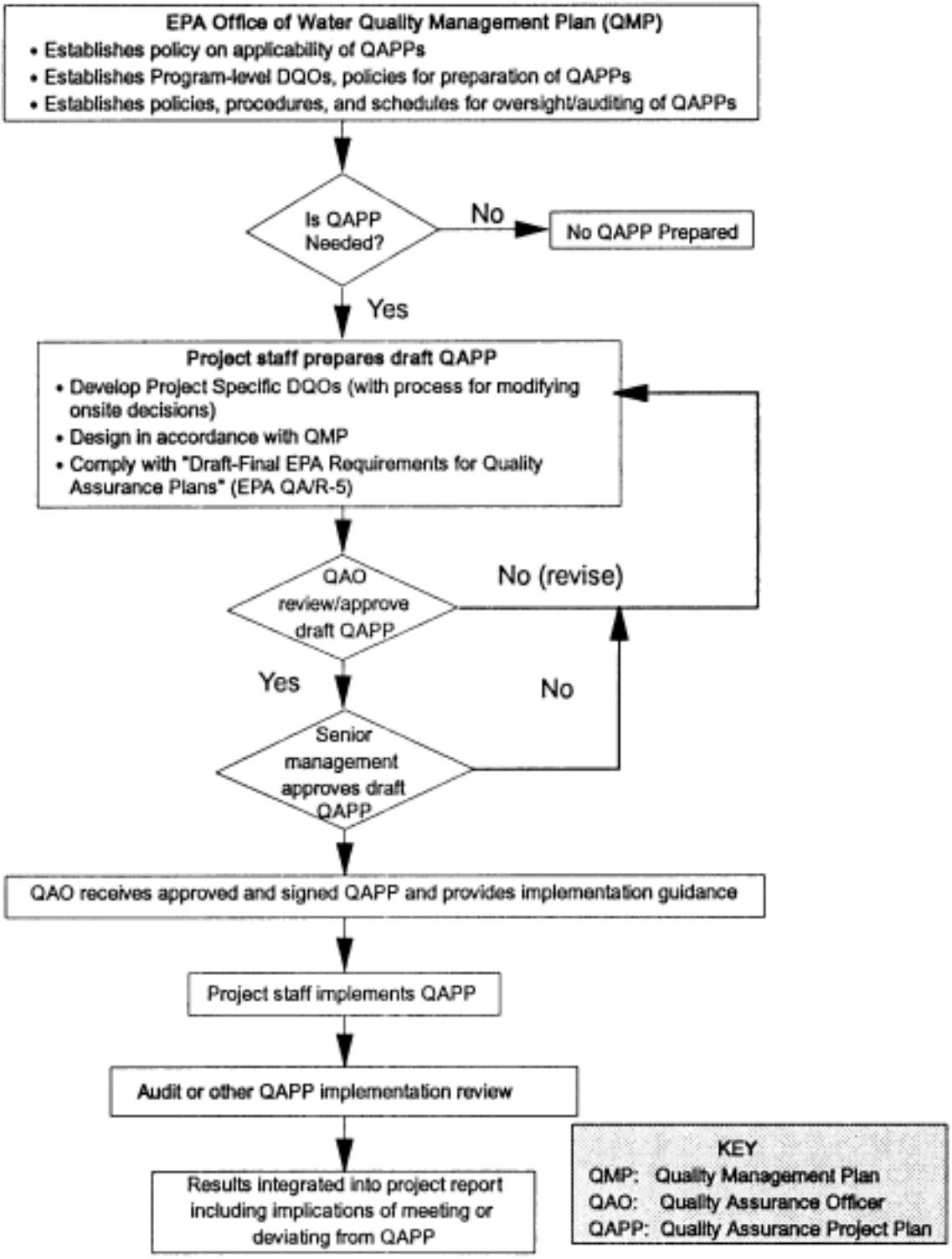

FIGURE 1 Generalized flow diagram for the preparation, approval, and implementation process of QAPPs.

- Production of DQOs for the project are discussed in Section 6. Calculation and information presentation procedures for data quality requirements (precision, completeness, representativeness, comparability) are provided in Sections 6, 19, and 23.

- Procedural and QA guidance for biomonitoring field and laboratory activities are presented in Sections 10 through 12.

- Section 13 outlines specific QC activities.

- Section 19 relates to required activities for rectifying project or procedural problems in reducing error sources.

- Section 20 presents guidance for presenting endpoints in individual QA procedures or sets thereof within formal QA reports.